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TITLE: Adaptive matched filter and vector correlator for a code division multiple access (CDMA) modem

Detailed Description Text (30):

As shown in FIG. 2c, up to 63 spreading-code sequences C.sub.0 through C.sub.63 are generated by tapping the output signals of FFs 203 and logically adding the short sequence C\* in a binary adders 213, 214, and 220, for example. One skilled in the art would realize that the implementation of the FF 203 create a cumulative delay effect for the code sequences produced at each FF stage in the chain. This delay is due to the nonzero electrical delay in the electronic components of the implementation. The timing problems associated with the delay can be mitigated by inserting additional delay elements into the FF chain. An exemplary FF chain with additional delay elements is shown in FIG. 2d.

## Detailed Description Text (141):

FIG. 15 indicates that the Code Generator 1304 provides the code sequences  $P_n \cdot \text{sub}.i(t)$ ,  $I=1, 2, \dots, I$  used by the receive channel despreaders 1703, 1704, 1705, 1706, 1707, 1708, 1709. The code sequences generated are timed in response to the SYNK signal of the system clock signal and are determined by the CCNTRL signal from the modem controller 1303 shown in FIG. 11. Referring to FIG. 15, the CDMA modem receiver section 1302 includes Adaptive Matched Filter (AMF) 1710, Channel despreaders 1703, 1704, 1705, 1706, 1707, 1708, 1709, Pilot AVC 1711, Auxiliary AVC 1712, Viterbi decoders 1713, 1714, 1715, 1716, Modem output interface (MOI) 1717, Rotate and Combine logic 1718, 1719, 1720, 1721, AMF Weight Generator 1722, and Quantile Estimation logic 1723.

Detailed Description Text (146):

The Auxiliary AVC 1712 also receives the I and Q digital receive message signal data and, in the described embodiment, includes four separate despreaders 2001, 2002, 2003, 2004 as shown in FIG. 18. Each despreader receives and correlates the I and Q digital receive message data with delayed versions of the same despreading-code sequence PARI and PARQ which are provided by code generator 1304 input to and contained in shift register 2020. The output signals of the despreaders 2001, 2002, 2003, 2004 are combined in combiner 2030 which provides noise correlation signal ARDSPRDAT. The auxiliary AVC despreading code sequence does not correspond to any transmit spreading-code sequence of the system. Signals OE1, OE2, . . . OE4 are used by the modem control 1303 to enable the despreading operation. The Auxiliary AVC 1712 provides a noise correlation signal ARDSPRDAT from which quantile estimates are calculated by the Quantile estimator 1733, and provides a noise level measurement to the ACQ & Track logic 1701 (shown in FIG. 15) and modem controller 1303 (shown in FIG. 11).

## Detailed Description Text (151):

The acquisition and tracking algorithms are used by the receiver to determine the approximate code phase of a received signal, synchronize the local modem receiver despreaders to the incoming pilot signal, and track the phase of the locally



calculated using the following C-subroutine:

Detailed Description Text (162):

where CG[n] are positive constants and GM[n] are negative constants (different values are used for scalar and vector quantiles).

Detailed Description Text (165):

where lambda[k] are as defined in the above section on quantile estimation, and SIGMA[k], ACCEPTANCE.sub.-- THRESHOLD and DISMISSAL.sub.-- THRESHOLD are predetermined constants. Note that SIGMA[k] is negative for values for low values of k, and positive for right values of k, such that the acceptance and dismissal thresholds can be constants rather than a function of how many symbols worth of data have been accumulated in the statistic.

CLAIMS:

4. The pilot vector correlator apparatus of claim 3, further comprising:

a phase locked loop (PLL) which measures a carrier phase error of the pilot data value and produces a composite carrier phase error signal; wherein each one of the plurality of despread multipath pilot signal components and the respective multipath signal weighting values is applied to a respective one of a plurality of complex multipliers with the composite phase error signal, wherein each multipath pilot signal component is multiplied by the respective weighting value and the respective phase error signal to produce a respective scaled and phase rotated pilot signal component, thereby to provide each of the plurality of scaled and phase rotated pilot signal components with a substantially equal carrier phase value.

9. The method of collecting signal power of a spread pilot channel as recited in claim 8, further comprising the steps of:

f) measuring, by a phase locked loop (PLL), a carrier phase error of the pilot data value to produce a composite carrier phase error signal; and

g) applying the composite phase error signal to respective ones of a plurality of complex multipliers with the plurality of despread multipath pilot signal components and the respective multipath signal weighting value;

wherein, in the complex multiplying step d), each multipath pilot signal component is complex multiplied by the respective weighting value and the respective phase error signal to produce a respective scaled and phase rotated pilot signal component, thereby to provide the plurality of scaled and phase rotated pilot signal components with a substantially equivalent carrier phase values.

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